

# NASA TECH BRIEF

## *Lewis Research Center*



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### Effects of Environmental Exposure on Cryogenic Thermal Insulation Materials

A study has been made of the effects on conventional cryogenic thermal insulation materials and components of long-term exposure to atmospheric and space conditions. The results are published in a comprehensive Materials Property Handbook. These data are particularly applicable to cryogenic insulation systems, but are also useful in other insulation applications.

This investigation was made to optimize selection of insulation materials for reusable space vehicles which will be repeatedly operated over periods of up to ten years both within and outside of the Earth's atmosphere. The materials tested included: aluminum- and gold-coated thin plastic films, silk and synthetic fiber fabrics, glass cloth, adhesives, fasteners, and thermal control paints. These materials were exposed for varying lengths of time to representative operating environments comprising various combinations of humidity, salt air, water immersion, temperatures, vacuum, and oxidizing fluids. The effect of these exposures on the properties of the materials was determined as a function of exposure time and temperature, and the other test conditions. Materials properties investigated included coating adhesion, flexibility, strength, compatibility, insulating properties, and other characteristics.

The results of this study are summarized in two reports. Volume I describes the tests and the significant findings. In Volume II, the extensive test data obtained are organized in handbook form.

#### Notes:

1. Further information is available in the following reports:

NASA CR-120978 (N73-17648), Volume I, Final Report -- Effect of Environment on Insulation Materials

NASA CR-120979 (N73-17649), Volume II, Materials Property Handbook -- Effect of Environment on Insulation Materials

Copies may be obtained at cost from:

Aerospace Research Applications Center  
Indiana University  
400 East Seventh Street  
Bloomington, Indiana 47401  
Telephone: 812-337-7833  
Reference: B73-10213

2. Specific technical questions may be directed to:

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